

FORM PTO 1390
(REV 5-93)

US DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

ATTORNEY DOCKET NO.
2000-1408ATRANSMITTAL LETTER TO THE UNITED STATES
DESIGNATED/ELECTED OFFICE (DO/EO/US)
CONCERNING A FILING UNDER 35 USC 371U.S. APPLICATION NO.
(if known, see 37 CFR 1.55)
[NEW] 097673467International Application No.
PCT/NO99/00123International Filing Date
April 16, 1999Priority Date Claimed
April 17, 1998Title of Invention
PROCESS PLANTApplicant(s) For DO/EO/US
Sverre Johannesen OVERÅ; Per SALATER

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 USC 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 USC 371.
3. ☒ This is an express request to begin national examination procedures (35 USC 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 USC 371(b) and PCT Articles 22 and 39(1).
4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☒ A copy of the International Application as filed (35 USC 371(c)(2))
 - a. ☒ is transmitted herewith (required only if not transmitted by the International Bureau). **ATTACHMENT A**
 - b. ☐ has been transmitted by the International Bureau.
 - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☐ A translation of the International Application into English (35 USC 371(c)(2)).
7. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 USC 371(c)(3)).
 - a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☐ have been transmitted by the International Bureau.
 - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
 - d. ☐ have not been made and will not be made.
8. ☐ A translation of the amendments to the claims under PCT Article 19 (35 USC 371(c)(3)).
9. ☒ An **unexecuted** oath or declaration of the inventor(s) (35 USC 371(c)(4)). **ATTACHMENT B**
10. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 USC 371(c)(5)).

Items 11. to 16. below concern other document(s) or information included:

11. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98. (w/International Search Report - **ATTACHMENT C**)
12. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☐ A **FIRST** preliminary amendment.
☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
14. ☐ A substitute specification.
15. ☐ A change of power of attorney and/or address letter.
16. ☒ Other items or information:
 International Preliminary Examination Report - **ATTACHMENT D**
 Notification Concerning Submission of Transmittal of Priority Document (PCT/IB/304) - **ATTACHMENT E**

U.S. APPLICATION NO. (if known, see 37 CFR 1.51) [NEW] 09/673467		INTERNATIONAL APPLICATION NO. PCT/NO99/00123		ATTORNEY DOCKET NO. 2000-1408A	
17. [X] The following fees are submitted				CALCULATIONS	PTO USE ONLY
BASIC NATIONAL FEE (37 CFR 1.492(a)(1)-(5)): <input type="checkbox"/> Search Report has been prepared by the EPO or JPO \$860.00 <input type="checkbox"/> International preliminary examination fee paid to USPTO (37 CFR 1.482) \$690.00 <input type="checkbox"/> No international preliminary examination fee paid to USPTO (37 CFR 1.482) but international search fee paid to USPTO (37 CFR 1.445(a)(2)) \$710.00 <input checked="" type="checkbox"/> Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO \$1000.00 <input type="checkbox"/> International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(2)-33(4) \$100.00 ENTER APPROPRIATE BASIC FEE AMOUNT =				\$1,000.00	
Surcharge of \$130.00 for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(e)).					
Claims	Number Filed	Number Extra	Rate		
Total Claims	4 - 20 =	0	X \$18.00		
Independent Claims	1 - 3 =	0	X \$80.00		
Multiple dependent claim(s) (if applicable)			+ \$270.00		
TOTAL OF ABOVE CALCULATIONS =				\$1,000.00	
Reduction by 1/2 for filing by small entity, if applicable. Verified Small Entity Statement must also be filed. (Note 37 CFR 1.9, 1.27, 1.28)				-	
SUBTOTAL =				\$1,000.00	
Processing fee of \$130.00 for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f)).				+	
TOTAL NATIONAL FEE =				\$1,000.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) (\$40 per property).				+	
TOTAL FEES ENCLOSED =				\$1,000.00	
				Amount to be refunded:	\$.
				charged:	\$

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- a. ☒ A check in the amount of \$ 1,000.00 to cover the above fees is enclosed.
- b. ☐ Please charge my Deposit Account No. 23-0975 in the amount of \$ _____ to cover the above fees. A duplicate copy of this sheet is enclosed.
- c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 23-0975. A duplicate copy of this sheet is enclosed.

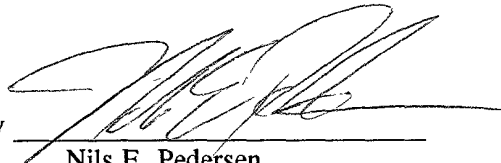
NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

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October 17, 2000
NEP/pjm

Check No.

40319

2000-1408A

THE COMMISSIONER IS AUTHORIZED
TO CHARGE ANY DEFICIENCY IN THE
FEE FOR THIS PAPER TO DEPOSIT
ACCOUNT NO. 23-0975.

2/PRTS

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Process plant

The present invention relates to a process plant for handling combustible fluids, for example an oil production plant in which gaseous hydrocarbons are separated from oil and in which surplus gases or residual gases from uncontrolled build-ups of gas pressure in the process escape through process or safety valves in the process plant and are conducted to a collection line.

It should be stressed that the expression process plant means not only plants for oil production in which hydrocarbon gases are separated from oil, but also refining plants and all types of equipment or plant in which combustible fluids are formed which must be handled optimally in terms of safety, finance and the environment.

In a process plant, for example a plant for the production of oil, there will normally be a large number of separators, compressors and/or other process equipment which are connected, in the process pipe line system, with valves, pressure regulators, temperature regulators and other components which, in given situations, may fail and lead to leaks, uncontrolled build-up of pressure, etc. The plant therefore has integral safety systems in the form of pressure control valves, safety valves and blow down valves which are connected to and will conduct surplus or residual fluids to a collection line for further transport to a flare for burning or emission into the atmosphere. In connection with flare burning, a combustion gas is usually added to the collection line continuously to ensure that a minimum flame is maintained in the flare. In connection with emission into the atmosphere without burning, an inert gas is usually added to prevent explosion.

ATTACHMENT A

British patent application no. 2.066.936 describes a refining plant for oil in which surplus gases in the form of hydrocarbons are recovered. The surplus gases are diverted from a flare line system and condensed in one or more stages by compression and cooling. The condensate is returned to the process. The residual gas, however, is conducted to a flare tower and burned.

East German patent specification no. 266.006 mentions a plant for combining combustible gases from several sources with different compositions in two main streams. The gases are combined using a computer which regulates the mixture on the basis of measurements of the calorific value of the gases. The gases are burned in a flare tower.

Moreover, Norwegian patent no. 177161 describes a solution for recovering surplus gas from an oil/gas treatment plant in which the surplus gas is collected in a collection line and recovered while gas which escapes in an emergency situation in connection with an abnormal increase in pressure (blow out) is conducted to a branch line for burning in a flare tower.

For all of the above known solutions, flares are used to burn all or part of the surplus gases or residual gases from the process plant. However, the use of a flare entails several disadvantages:

- The construction of the flare (flare tower) in itself is very expensive and will account for a not inconsiderable part of the overall costs of a process plant.
- Burning or emitting the surplus gases represents an environmental problem as CO₂ and hydrocarbon gases will, among other things, contribute to the greenhouse effect.
- The surplus gases or fluids are valuable in themselves and represent a direct financial loss when burned or emitted into the environment.

The present invention describes a device in connection with a process plant in which the stated disadvantages have been eliminated, i.e. in which the flare has been removed and all surplus gases and residual gases are dealt with and recycled.

The present invention is characterised in that the surplus or residual gases are conducted via a collection line to one or more low-pressure stores and that a connection line or return line is arranged from the store's gas area to the process or another treatment unit for the processing of the gas.

Claims 2-3 define advantageous features of the invention.

The present invention will be described in the following in further detail by means of examples and with reference to the attached drawings, where

Fig. 1 shows a simplified process diagram for a traditional process plant with a flare tower.

Fig. 2 shows a simplified process diagram for a process plant in accordance with the present invention without a flare tower.

Fig. 1 shows, as stated, a simplified process diagram of a traditional process plant, for example an oil production plant, in which a flare tower is used to burn the surplus gases. The raw product or crude oil is added to the process 1 from one or more low-pressure crude oil stores 2 via a line 3. The process itself may comprise several process stages with compressors and condensers (not shown) and is designed to separate gaseous hydrocarbons from the oil and transfer them as processed products, for example via lines 4, 5, to an appropriate product store 13.

A process plant like this will, as stated in the introduction, contain equipment and components, for example valves, pressure regulators and temperature regulators, which may fail and lead to leaks and build-ups of pressure. The plant will, therefore, be fitted with blow down valves (BDV), pressure control valves (PV) and pressure safety valves (PSV) 6, 7, 8, which are designed to allow fluid (gas) to escape in

connection with a shutdown and when unforeseen leaks or build-ups of pressure occur. These fluids are collected in a collection line 9 and conducted to a flare tower 10 for burning or emission into the atmosphere. In the latter case, inert gas is also added from an inert gas source (not shown) via line 14.

Fig. 2 shows a simplified process diagram of the solution in accordance with the present invention. The process is the same as in the example shown in Fig. 1 and described above but the flare tower has been eliminated by the fluid which is collected in the collection line 9 being returned to the low-pressure crude oil store 2 upstream of the process plant.

Surplus gases which are collected in the store 2 can expediently be returned to the process as gas for reuse via line 11. If the conditions are present, some of the gas will condense in the low-pressure store 2. This condensed gas and any liquid from the fluid can expediently be returned to the process via the raw product line 3. In order to create lower pressure and thus increased capacity in the store 2, a fan or compressor 12 can also be arranged in connection with the return line 11. It should be noted that the present invention will require a relatively large store volume to be able to work within fixed safety margins. Such a volume will usually exist at all major crude oil plants.

However, it should also be noted that the present invention as it is described in the claims is not restricted to a solution in which the surplus gases or fluids have to be conducted to the low-pressure product store. It is possible to establish a separate store volume, for example a separate tank to which the surplus gases are conducted. Moreover, the collected gas or fluid (liquid) does not have to be returned to the process but can be conducted to another separate treatment unit (not shown). Moreover, a control valve 15 should be arranged in connection with the collection line 9 in order to isolate the low-pressure store 2 from the process when the plant is not in operation. Moreover, surplus pressure protection 17 should be arranged in parallel with the control valve 15 in case the latter fails to open. A manual stop valve (diverter

valve) 17 should be used to allow maintenance of the control valve 15 and the surplus pressure protection 17.

The present invention describes a solution in connection with a process plant which has a number of advantages compared with the known solutions:

- The use of a flare tower with associated equipment is completely eliminated and the investment costs in connection with the construction of the process plant and the maintenance costs are therefore considerably less.
- By eliminating the use of a flare, emissions of environmentally hazardous hydrocarbon gases, CO₂ and NO_x gases are avoided. At the same time, major savings are achieved as there will be no need to add gas to the pilot flare and as the surplus gases are returned to the process and "reused".
- As the construction of a flare tower is not necessary, the visually unattractive structure of the flare tower is also avoided. Moreover, the unattractive flare, the high noise level and the smoke which are associated with the use of a flare are also avoided.
- Moreover, the present invention offers an improvement in safety, among other things because the use of an open flame is eliminated and the relief of surplus pressure built up will be shorter?.

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Claims

1. Process plant (1) for handling combustible fluids, for example an oil production plant in which gaseous hydrocarbons are separated from oil and in which surplus gases or residual gases from uncontrolled build-ups of gas pressure in the process escape through process or safety valves in the plant and are conducted to a collection line (9).
characterised in that
the surplus or residual gases are conducted via the collection line (9) to one or more low-pressure stores (2) and that a connection line or return line (11, 3) is arranged from the store(s) (2) to the process or another treatment unit for processing the returned or collected fluid.
2. Process plant according to claim 1,
characterised in that
the low-pressure store(s) comprise(s) the crude oil or raw product store (2) of the process plant upstream of the process plant.
3. Process plant according to claim 1,
characterised in that
the return line (11) is connected to the gas area of the raw product store and that any condensed gas and liquid from the fluid which is added to the store (2) via the collection line (9) is returned to the process via the raw product line (3).
4. Process plant according to claim 3,
characterised in that
a fan or compressor (12) is arranged in connection with the return line (11).

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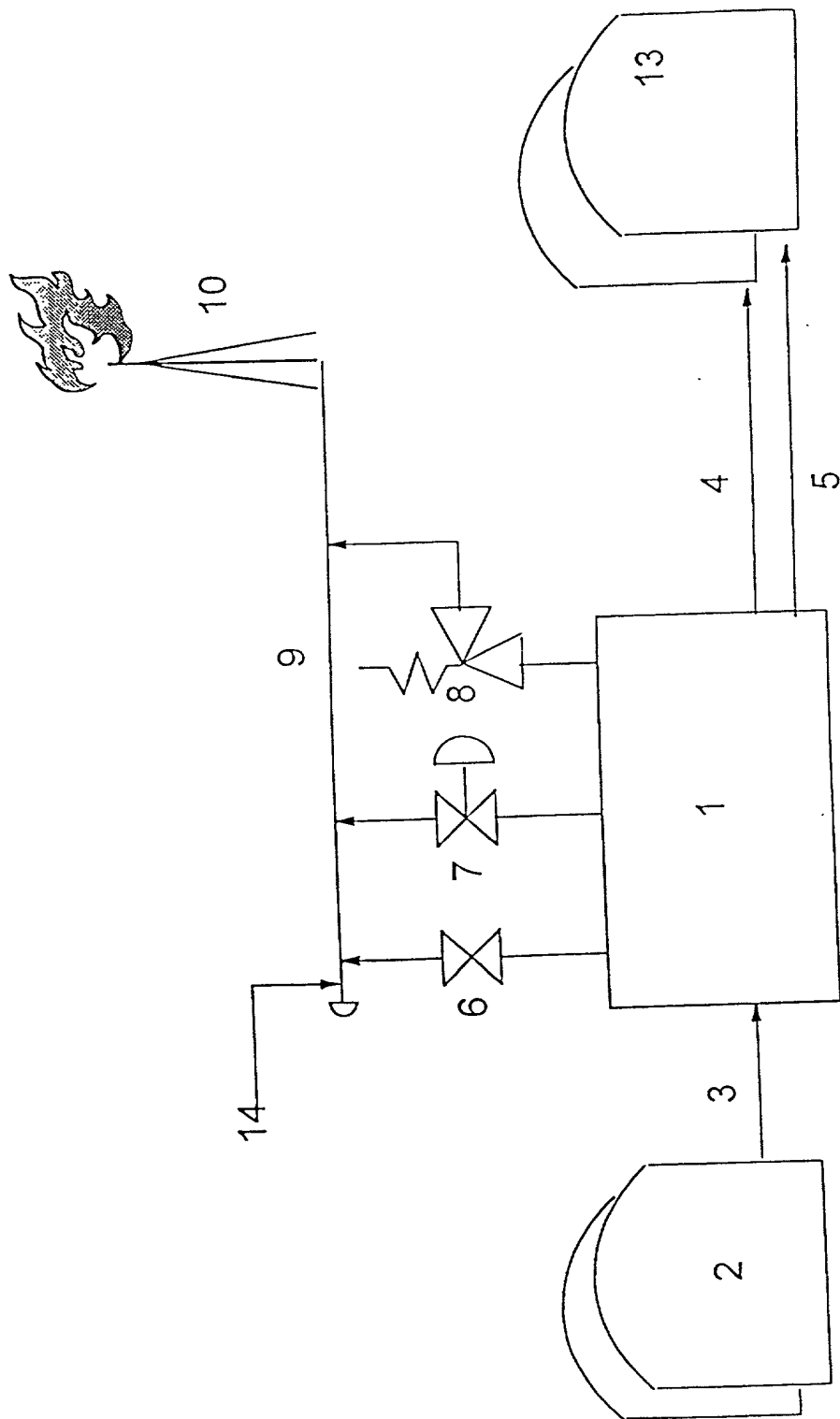


Fig.1

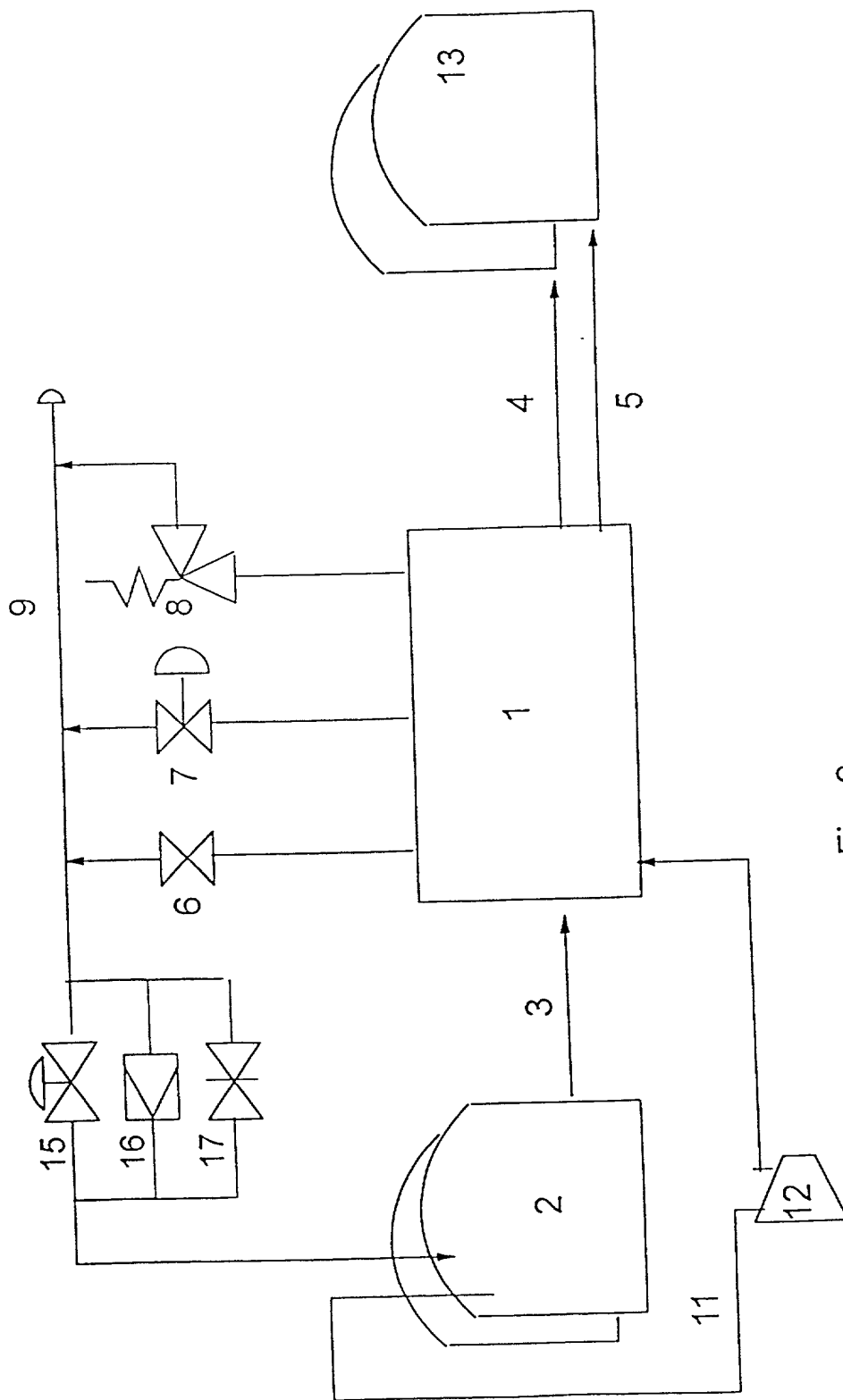
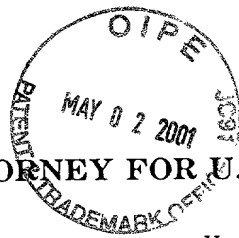


Fig. 2



DECLARATION AND POWER OF ATTORNEY FOR U.S. PATENT APPLICATION

() Original () Supplemental () Substitute (X) PCT () Design

As a below named inventor, I hereby declare that: my residence, post office address and citizenship are as stated below next to my name; that I verily believe that I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural inventors are named below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

Title: "Process plant" (derived from PCT/NO99/00123)

of which is described and claimed in:

- () the attached specification, or
 () the specification in the application Serial No. _____ filed _____;
 and with amendments through _____ (if applicable), or
 (X) the specification in International Application No. PCT/NO99/00123, filed April 16, 1999, and as amended
 on _____ (if applicable).

I hereby state that I have reviewed and understand the content of the above-identified specification, including the claims, as amended by any amendment(s) referred to above.

I acknowledge my duty to disclose to the Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, §1.56.

I hereby claim priority benefits under Title 35, United States Code, §119 (and §172 if this application is for a Design) of any application(s) for patent or inventor's certificate listed below and have also identified below any application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

COUNTRY	APPLICATION NO.	DATE OF FILING	PRIORITY CLAIMED
Norway	19981734	April 17, 1998	Yes

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose information material to patentability as defined in Title 37, Code of Federal Regulations, §1.56 which occurred between the filing date of the prior application and the national or PCT international filing date of this application.

APPLICATION SERIAL NO.	U.S. FILING DATE	STATUS: PATENTED, PENDING, ABANDONED

And I hereby appoint John T. Miller, Reg. No. 21,120; Michael R. Davis, Reg. No. 25,134; Matthew M. Jacob, Reg. No. 25,154; Jeffrey Nolton, Reg. No. 25,408; Warren M. Cheek, Jr., Reg. No. 33,367; Nils E. Pedersen, Reg. No. 33,145 and Charles R. Watts, Reg. No. 33,142, who together constitute the firm of WENDEROTH, LIND & PONACK, L.L.P., attorneys to prosecute this application and to transact all business in the U.S. Patent and Trademark Office connected therewith.

I hereby authorize the U.S. attorneys named herein to accept and follow instructions from _____ as to any action to be taken in the U.S. Patent and Trademark Office regarding this application without direct communication between the U.S. attorneys and myself. In the event of a change in the persons from whom instructions may be taken, the U.S. attorneys named herein will be so notified by me.

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Residence & Citizenship	CITY	STATE OR COUNTRY	COUNTRY OF CITIZENSHIP
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Full Name of Seventh Inventor	FAMILY NAME	FIRST GIVEN NAME	SECOND GIVEN NAME
Residence & Citizenship	CITY	STATE OR COUNTRY	COUNTRY OF CITIZENSHIP
Post Office Address	ADDRESS	CITY	STATE OR COUNTRY ZIP CODE

I further declare that all statements made herein of my own knowledge are true, and that all statements on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Sverre Johannesen

1st Inventor Overå John A. Overå Date 12 October 2000
 Per PS Salater Date 12 October 2000
 2nd Inventor _____ Date _____
 3rd Inventor _____ Date _____
 4th Inventor _____ Date _____
 5th Inventor _____ Date _____
 6th Inventor _____ Date _____
 7th Inventor _____ Date _____

The above application may be more particularly identified as follows:

U.S. Application Serial No. _____ Filing Date _____
 Applicant Reference Number _____ Atty Docket No. _____
 Title of Invention _____